

FINAL ENVIRONMENTAL IMPACT STATEMENT



on a
Proposed Nuclear Weapons Nonproliferation
Policy Concerning Foreign Research Reactor
Spent Nuclear Fuel



United States Department of Energy
Assistant Secretary for Environmental Management
Washington, DC 20585



Department of Energy

Washington, DC 20585

February 8, 1996

Dear Interested Party:

I am enclosing a copy of the final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel. The Department of Energy, in cooperation with the State Department, prepared the final Environmental Impact Statement.

This study analyzes the potential environmental impacts of adopting a policy to manage foreign research reactor spent fuel containing uranium enriched in the United States. In particular, the study examines the comparative impacts of several alternative approaches to managing the spent fuel. The analyses demonstrate that the impacts on the environment, workers and the general public of implementing any of the alternative management approaches would be small and within applicable Federal and state regulatory limits.

The Department's preferred approach to managing the spent fuel, referred to in the study as the "preferred alternative," is for the Department to receive the spent fuel into the United States, and to manage it at the Department's Savannah River Site in South Carolina and the Idaho National Engineering Laboratory. The spent fuel would be shipped to the United States over 13 years through two military ports. The Charleston Naval Weapons Station in South Carolina would receive about one to two shipments every month beginning in 1996. The Concord Naval Weapons Station in California would receive far fewer shipments (as few as five shipments over a 13-year period) beginning in 1997.

The final Environmental Impact Statement is a three-volume document, approximately 4000 pages in length. Volume 1 (494 pages) describes the policy considerations of adopting a policy to manage foreign research reactor spent fuel, and the potential environmental impacts. Volume 2 (1111 pages) contains eight appendices relating to the technical analyses. Volume 3 (2230 pages) contains the public's comments on the draft Environmental Impact Statement, the Department's responses to those comments, and summaries of the 17 public hearings held throughout the United States during the 90-day comment period on the draft.

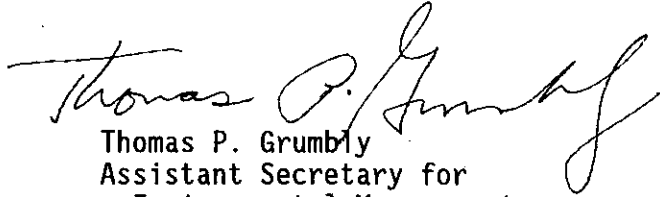
If you would like another copy of the entire study, a particular volume, or an additional copy of the Summary, we would be pleased to send it to you. Please let us know by calling the Department's Center for Environmental Management Information at 1-800-736-3282 (toll-free). The entire document will be placed in the public reading rooms and information locations listed in the Summary.



Printed with soy ink on recycled paper

The Department will not make a final decision on whether to adopt the proposed policy until late March 1996. Thank you for your interest in this proposed action.

Sincerely,

A handwritten signature in black ink, appearing to read "Thomas P. Grumbly". The signature is fluid and cursive, with a large, stylized "G" and "y".

Thomas P. Grumbly
Assistant Secretary for
Environmental Management

Enclosure

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on a

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United States Department of Energy
Assistant Secretary for Environmental Management
Washington, DC 20585

Cover Sheet

Responsible Agencies: Lead Agency: United States Department of Energy
 Cooperating Agency: United States Department of State

Title: Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel

Contact: For further information, concerning this Final Environmental Impact Statement, contact:

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For general information on the United States Department of Energy's National Environmental Policy Act process, call 1-800-472-2756 to leave a message, or contact:

Carol Borgstrom, Director
Office of NEPA Policy and Assistance (EH-42)
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Abstract: The United States Department of Energy and United States Department of State are jointly proposing to adopt a policy to manage spent nuclear fuel from foreign research reactors. Only spent nuclear fuel containing uranium enriched in the United States would be covered by the proposed policy. The purpose of the proposed policy is to promote U.S. nuclear weapons nonproliferation policy objectives, by seeking to reduce and eventually eliminate highly-enriched (weapons-grade) uranium from civilian commerce worldwide. Environmental effects and policy considerations of three Management Alternative approaches for implementation of the proposed policy are assessed. The three Management Alternatives analyzed are: (1) acceptance and management of the spent nuclear fuel by the Department of Energy in the United States, (2) facilitate the management of the spent nuclear fuel at one or more foreign facilities (under conditions that satisfy United States nuclear weapons nonproliferation policy objectives), and (3) a combination of elements from one or both of Management Alternatives 1 and 2 (Hybrid Alternative). A No Action Alternative is also analyzed.

For each Management Alternative, there are a number of implementation alternatives. For Management Alternative 1, this document addresses the environmental effects of various implementation alternatives, such as varied policy durations, management of various quantities of spent nuclear fuel, chemical separation, developmental treatment and/or packaging technologies, and differing financing arrangements. Environmental impacts are also examined at various potential ports of entry, along truck and rail transportation routes, at candidate management sites, and for alternate storage technologies. For Management Alternative 2, this document addresses the environmental effects of two implementation alternatives: (1) assisting foreign nations with storage; and (2) assisting foreign nations with reprocessing

of the spent nuclear fuel. With respect to Management Alternative 3, an example Hybrid Alternative is analyzed wherein a portion of the spent nuclear fuel would be processed at overseas facilities and the remaining portion would be managed in the United States.

The United States Department of Energy and United States Department of State, in consultation with other government agencies, designate the acceptance and management of the foreign research reactor spent nuclear fuel in the United States (i.e., Management Alternative 1 with modifications to several basic implementation elements) as the preferred alternative.

Public Comments: The public comment period on the Draft EIS was conducted from April 21, 1995 to July 20, 1995. During this period, DOE held 17 public hearings in the locations most likely to be directly affected by the EIS alternatives, including the 10 candidate ports of entry and 5 candidate spent nuclear fuel management sites. In addition, a public hearing was held in Washington, D.C. The Draft EIS was made available to the public through mailings, requests to DOE's Environmental Management Information Center, and at DOE Public Reading Rooms and other designated information locations.

Foreword

This Final Environmental Impact Statement presents an evaluation of policy considerations and potential environmental impacts resulting from the U.S. Department of Energy and the U.S. Department of State joint proposal to adopt a policy to manage spent nuclear fuel from foreign research reactors. Only spent nuclear fuel that contains uranium enriched in the United States would be covered by the proposed policy. The purpose of the proposed policy would be to promote nuclear weapons nonproliferation objectives of the United States, specifically by seeking to reduce, and eventually to eliminate, highly-enriched (weapons-grade) uranium from civil commerce worldwide. This policy is jointly proposed by the U.S. Department of Energy and the U.S. Department of State. This document was prepared in compliance with the National Environmental Policy Act and in accordance with regulations issued and published by the Council on Environmental Quality (40 CFR Parts 1500-1508) and the U.S. Department of Energy (10 CFR Part 1021).

Environmental effects and policy considerations of several alternative approaches for implementation of the proposed policy are assessed. Three Management Alternatives are analyzed: (1) acceptance and management of the spent nuclear fuel by the Department of Energy in the United States; (2) facilitate the management of the spent nuclear fuel at one or more foreign facilities under conditions that satisfy United States nuclear weapons nonproliferation policy objectives; and (3) a combination of components of Management Alternatives 1 and 2 (Hybrid Alternative Example). A No Action Alternative is also analyzed.

For each Management Alternative, there are a number of alternatives for its implementation. For Management Alternative 1, this document addresses the policy implications and environmental effects of various implementation alternatives such as varied policy durations, management of various quantities of spent nuclear fuel, and differing financing arrangements. Environmental impacts at various potential ports of entry, along truck and rail transportation routes, at candidate management sites, and for alternate storage technologies are also examined. For Management Alternative 2, this document addresses two subalternatives: (1) assisting foreign nations with storage; and (2) assisting foreign nations with reprocessing of the spent nuclear fuel. With respect to Management Alternative 3, a hybrid alternative example is analyzed, utilizing the analysis provided for Management Alternatives 1 and 2, wherein a portion of the spent nuclear fuel would be processed at overseas facilities and the remaining portion would be managed in the United States.

A Notice of Intent to prepare this document was published in the Federal Register on October 21, 1993. Nine public scoping meetings were conducted during November and December of 1993. The period for acceptance of public comments on this document closed on December 8, 1993. However, the United States Department of Energy continued to accept written comments through January 31, 1994. In October 1994, the Implementation Plan for this Environmental Impact Statement was issued to provide guidance for its preparation and to record the U.S. Department of Energy's disposition of comments received during the scoping process.

The Draft Environmental Impact Statement was issued in April 1995. The public comment period on the Draft Environmental Impact Statement was from April 21, 1995 to July 20, 1995. During this period, DOE held 17 public hearings in the locations most likely to be directly affected by the EIS alternatives, including the 10 candidate ports of entry and 5 candidate spent nuclear fuel management sites. In addition,

a public hearing was also held in Washington, D.C. The Draft EIS was made available to the public through mailings, requests to DOE's Environmental Management Information Center, and at DOE Public Reading Rooms and other designated information locations.

Results of the environmental analyses are presented in two volumes. Volume 1 is composed of eight chapters. Chapter 1 gives the background description of the United States nuclear weapons nonproliferation policy and describes the purpose and need for the proposed action. Chapter 2 then states the proposed policy and describes the three Management Alternatives for its implementation. It includes a discussion of the basic implementation components of Management Alternative 1, as well as implementation alternatives that vary one component of the basic implementation of Management Alternative 1. The implementation alternatives include variations on the duration of the policy, alternative amounts of material that might be covered by the policy, and various financing alternatives. The potential ports of entry, transportation routes, candidate spent nuclear fuel management sites and storage technologies are also described. This chapter also describes Management Alternative 2, which contains two subalternatives for its implementation. Subalternative 1 is to provide assistance to foreign nations with storage of the spent nuclear fuel. Subalternative 2 is to provide assistance with reprocessing of the spent nuclear fuel at one or more foreign locations. Management Alternative 3 is also discussed in this Chapter by tiering off the evaluation and analyses provided for Management Alternatives 1 and 2. The potentially affected environment under Management Alternatives 1 and 3 is described in Chapter 3. Essential results of the environmental analyses are then given in Chapter 4, which summarizes the methods used in the evaluation and provides an assessment of the environmental effects. Details of the environmental analyses are provided in the appendices, which comprise Volume 2 of this document. Chapter 5 describes applicable laws, regulations, and other requirements. A list of the preparers of this Final Environmental Impact Statement, agencies consulted, and references are provided in Chapters 6, 7, and 8, respectively. In addition to these two volumes, a Volume 3 (Comment Response Document) has been added to the Final Environmental Impact Statement which contains the written and oral comments received during the public comment period for the Draft Environmental Impact Statement.

In consideration of public comments, DOE has added information to the EIS including: clarification of the proposed U.S. policy on accepting spent nuclear fuel from allies; examination of the consequences of sabotage or terrorist attack; safety of transportation casks; re-examination of the shipboard fire analysis, and general provisions of transportation and emergency response regulations and management. The Naval Weapons Station at Charleston was analyzed in addition to the other terminals of the Port of Charleston within the greater Charleston area that were discussed in the Draft Environmental Impact Statement.

This Final Environmental Impact Statement has a two-fold purpose. The first purpose is to provide decision makers in the U.S. Department of Energy and the U.S. Department of State with an evaluation of the environmental effects of these policies. The second purpose is to inform the public concerning the essential features, policy considerations, and potential environmental effects of the proposed policy, and to provide the public an opportunity to provide feedback to the U.S. Department of Energy and the U.S. Department of State on the proposed policy.

Reader's Guide

In response to comments submitted after issuance of the Draft Environmental Impact Statement in April 1995, and due to additional technical and policy details not available at the time of issuance of the Draft Environmental Impact Statement, Volumes 1 and 2 of the Final Environmental Impact Statement contain revisions and changes. The revisions and changes made since issuance of the Draft Environmental Impact Statement are indicated by a line in the margin of Volumes 1 and 2. A new Appendix H has been added to Volume 2 to describe the general provisions associated with transportation planning for potential

shipments of foreign research reactor spent nuclear fuel. In addition, Volume 1 and each appendix in Volume 2 provide a unique reference list to enable the reader to further review and research selected topics. The U.S. Department of Energy has established reading rooms and information locations across the United States where these references may be reviewed or obtained for review through interlibrary loan. The addresses and phone numbers for these reading rooms and information locations are provided at the end of the accompanying Summary.

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Acronyms and Abbreviations

BNFP	Barnwell Nuclear Fuels Plant
CFR	Code of Federal Regulations
Ci	Curie
cm	centimeter
DOE	Department of Energy
EDE	Effective Dose Equivalent
EIS	Environmental Impact Statement
E-MAD	Engine Maintenance and Disassembly
FAST	Fluorinel Dissolution and Fuel Storage
FMEF	Fuel Maintenance and Examination Facility
g	gram
ha	hectare
HEU	Highly-Enriched Uranium
ICPP	Idaho Chemical Processing Plant
IFSF	Irradiated Fuel Storage Facility
ISO	International Organization for Standardization
kgTM	kilograms of Total Mass
km	kilometer
l	liter
LCF	latent cancer fatality
LEU	Low Enriched Uranium
m	meters
MACCS	MELCOR Accident Consequences Code System
MEI	Maximally Exposed Individual
mg	milligram
mg/l	milligrams per liter
mi	mile
min	minute
ml	milliliter
mm	millimeter
MOTSU	Military Ocean Terminal at Sunny Point
mrem	millirem
MTHM	Metric Tons of Heavy Metal
MTR	Material Test Reactor
NEPA	National Environmental Policy Act
NPAI	Nearest Public Access Individual
NRC	Nuclear Regulatory Commission
NWS	Naval Weapons Station
ppt	parts per thousand
rad	radiation absorbed dose
RBOF	Receiving Basin for Offsite Fuels
rem	roentgen equivalent man
RERTR	Reduced Enrichment for Research and Test Reactors
SNF&INEL Final EIS	Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement
TRIGA	Training, Research, Isotope, General Atomic reactors